Name: Enrolment No:	

UPES
End Semester Examination, May 2023
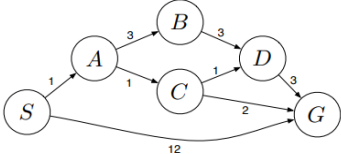
Course: Artificial Intelligence and Machine Learning	Semester: VI
Program: B. Tech. (ECE)	Time : 03 hrs.
Course Code: ECEG 3073P	Max. Marks: 100

Instructions: Attempt all the questions

	SECTION A (5Qx4M=20Marks)		
S. No.		**Marks**	**CO**
Q 1	Define supervised, unsupervised, and reinforcement learning with suitable examples.	**4M**	**CO1**
Q 2	What is Conceptual Dependency (CD)? List the advantages and disadvantages of CD.	**4M**	**CO2**
Q 3	What are the different types of Knowledge Representation? Explain each of them.	**4M**	**CO2**
Q 4	What is the difference between Syntax and Semantics? Explain with the help of examples.	**4M**	**CO2**
Q 5	Explain hill-climbing algorithm. Write its advantages and disadvantages.	**4M**	**CO1**
	SECTION B (4Qx10M= 40 Marks)		
Q 6	How are *Genetics* represented in the Genetic Algorithm? Explain some basic concepts and terms related to Genetic Algorithm.	**10M**	**CO5**
Q 7	What is particle swarm optimization (PSO)? Write the pseudo-code of PSO.	**10M**	**CO5**
Q 8	 (a) What path would breadth-first graph search return for this search problem? (b) What path would uniform cost graph search return for this search problem? (c) What path would depth-first graph search return for this search problem?	**10M**	**CO1**

	(d) What path would A* graph search, using a consistent heuristic, return for this search problem?		

Q 9	Explain resolution. What are the issues of using resolution? Using resolution solve the following statements.
	Prove: It will Rain
	• Humidity is high or the sky is cloudy.
	• If the sky is cloudy then it will Rain.
	• If the humidity is high then it is hot.
	• It is not hot.
	
	OR
	
	Write a short note the following:
	    (a) Propositional Logic (PL)
	    (b) First Order Logic (FOL)
	    (c) Semantic Networks
	    (d) Scripts
		10M	**CO2**

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SECTION-C
(2Qx20M=40 Marks)

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Q 10	(a) You come up with a convolution neuron network (CNN) classifier. For each layer, calculate the number of weights, number of biases, and the size of the associated feature maps. The notation follows the convention: • CONV-K-N denotes a convolutional layer with N filters, each them of size K×K, Padding and stride parameters are always 0 and 1 respectively. • POOL-K indicates a K × K pooling layer with stride K and padding 0. • FC-N stands for a fully-connected layer with N neurons.	**20M**	**CO4**

Layer	Activation map dimensions	Number of weights	Number of biases
INPUT	$128 \times 128 \times 3$	0	0
CONV-9-32			
POOL-2			
CONV-5-64			
POOL-2			
CONV-5-64			
POOL-2			
FC-3			

(b) Draw and explain the architecture of the convolution neuron network (CNN). Explain the working of CNN at each layer with a suitable example.

Q 11	**Attempt any Two Questions** (a) What is classification in a supervised learning algorithm? Briefly explain the classification learning steps with a flow chart. Discuss the kNN and SVM classification model with its strength, weakness and applications.	**20M**	**CO3**

(b) Explain the following evaluation parameters of supervised machine learning algorithm:

(i) Coefficient of determination

(ii) RMSE

(iii) Confusion matrix

(iv) Jaccard Index

(v) F1-score

(c) Following is the training data for a group of athletes. Based on this data, use k-NN algorithm and classify Sayan (Weight=56kg; Speed=10kmph) as a Good, Average, or Poor sprinter. Write all steps of KNN algorithm.

Name	Weight (kg)	Speed (kmph)	Class
Nitesh	55	9	Average
Gurpreet	58	8	Poor
Goutam	60	7.5	Poor
Gulshan	59	8.5	Average
Mohit	57	10	Good
Sahil	53	10.5	Good
Samyak	53	10	Good